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Proeryon hartmanni (v. Meyer, 1835)
(Crustacea, Decapoda, Eryonoidea) and
Archaeopalrinurus cfr. *A. levis* Pinna, 1974 (Crustacea,
Decapoda, Palinuroidea) from the Lower Jurassic
(Toarcian) of Cesana Brianza-Suello (Lecco, N Italy)

Abstract - A sample of macruran decapod crustaceans, discovered in a quarry located between Cesana Brianza and Suello villages (Lecco, N Italy) is described. The specimens are preserved in an marl and marly-limestone levels of Formazione di Sogno, dated to lower Toarcian (Lower Jurassic). *Proeryon hartmanni* (v. Meyer, 1835) (infraorder Palinura Latreille, 1802, family Coleiidae Van Straelen, 1924), already known from the Lower Jurassic of Sogno (Lecco, N Italy) and Holzheim, Holzmaden, Banz, and Unterstürmig (Germany) is identified. One specimen was compared with *Archaeopalrinurus levis* Pinna, 1974 (infraorder Palinura Latreille, 1802, family Palinuridae Latreille, 1802), known to date in the Upper Triassic of Lombardy. The discovery of decapods in Cesana Brianza-Suello quarry allowed to deep the knowledge of the faunistic assemblage of the Formazione di Sogno, reported partially for the first time by Garassino & Teruzzi (2001).

Key words: Crustacea, Decapoda, Jurassic, Italy.

Riassunto - *Proeryon hartmanni* (v. Meyer, 1835) (Crustacea, Decapoda, Eryonoidea) e *Archaeopalrinurus* cfr. *A. levis* Pinna, 1974 (Crustacea, Decapoda, Palinuroidea) del Giurassico inferiore (Toarciano) di Cesana Brianza-Suello (Lecco, N Italia).

Viene descritto un campione di crostacei decapodi macruri rinvenuto in una cava posta tra gli abitati di Cesana Brianza e di Suello (Lecco, N Italia). Gli esemplari provengono da un livello a marne e calcari-marnosi della Formazione di Sogno databile al Toarciano inferiore (Giurassico inferiore). Lo studio degli esemplari ha permesso di identificare *Proeryon hartmanni* (v. Meyer, 1835) (infraordine Palinura Latreille, 1802, famiglia Coleiidae Van Straelen, 1924) già conosciuto nel Giurassico inferiore di Sogno (Lecco, N Italia) e di Holzheim, Holzmaden, Banz, and Unterstürmig (Germania). Un solo esemplare è stato confrontato con *Archaeopalrinurus levis* Pinna, 1974 (infraordine Palinura Latreille, 1802, famiglia Palinuridae Latreille, 1802), conosciuto finora nel Triassico superiore della Lombardia. Il rinvenimento di decapodi nella cava di Cesana Brianza-Suello ha permesso di ampliare le conoscenze dell'associazione faunistica della Formazione di Sogno, segnalata parzialmente per la prima volta da Garassino & Teruzzi (2001).

Parole chiave: Crustacea, Decapoda, Giurassico, Italia.

Introduction and geological setting

The studied decapod crustaceans were discovered in the eastern side of a quarry located between the villages of Cesana Brianza and Suello (Lecco) (Fig. 1). The

quarry (600-650 m above sea level) is located on the southern side of the Monte Cornizzolo – Monte Rai anticline (Fig. 2). The southern side consists of well stratified rocks, strongly deformed, dated from Jurassic to Cretaceous.

The specimens are preserved in the Formazione di Sogno whose age is lower



Fig. 1 - Location of Cesana Brianza-Suello fossiliferous locality (asterisk).

Fig. 1 - Ubicazione della località fossilifera di Cesana Brianza-Suello (asterisco).



Fig. 2 - Cesana Brianza-Suello quarry.

Fig. 2 - Cava di Cesana Brianza-Suello.

Toarcian (Lower Jurassic). It lies upon the Formazione di Morbio and is overlain by the Rosso Ammonitico Lombardo (Delfino & Dal Sasso, 2003). Today the Formation of Sogno, discovered between 1999 and 2003, is covered after a reclamation work.

The Formazione di Sogno was divided into three sections Cesana 1, Cesana 2 and Cesana 3. Only sector E of section Cesana 2 is fossiliferous. In this sector the formation, 60 cm thick, consists of grey marls with thin laminated marly-limestone layers. Gaetani & Erba (1990) referred the Formazione di Sogno to the lower Toarcian (Fig. 3).

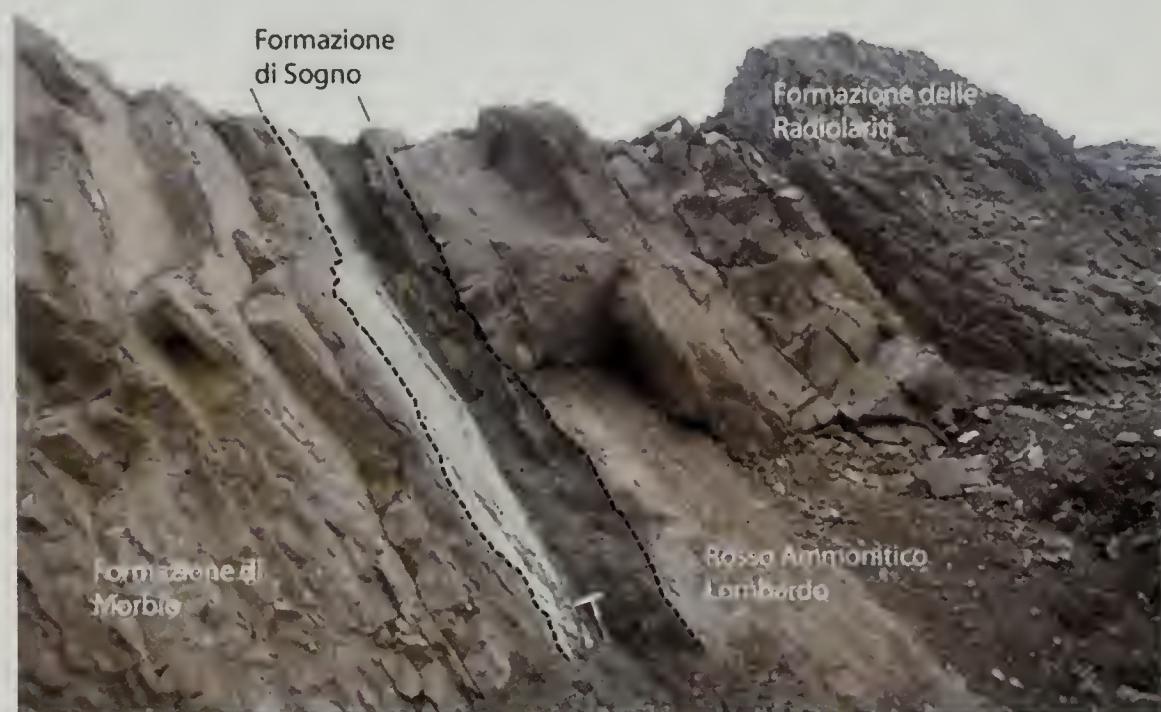


Fig. 3 - Formazione di Sogno in Cesana Brianza-Suello quarry.

Fig. 3 - Formazione di Sogno nella cava di Cesana Brianza-Suello.

The faunal assemblage includes invertebrates and vertebrates; plants were not recorded. The invertebrates are represented by decapod crustaceans, the subject of the present paper, while the vertebrates include actinopterygians, like *Leptolepis*, and reptiles referred to *Steneosaurus* or *Metriorhynchus* (Delfino & Dal Sasso, 2003).

The assignment of the faunal assemblage to the lower Toarcian is justified by the discovery of ammonites, like *Dactylioceras*, and calcareous nannofossils, like *Mitrolithus*, *Lotharingius*, and *Carinolithus* (Cobianchi, 1992; Delfino & Dal Sasso, 2003). The absolute age of the Formazione di Sogno of Cesana Brianza-Suello is between 189.6 and 186.8 +/- 4.3 m. y. (Delfino & Dal Sasso, 2003).

Decapod crustaceans from the Jurassic of Italy

The decapod crustaceans from the Jurassic of Italy are very rare and limited

today to only three reports. Colosi (1921) described *Heteroglyphea paronae* from the Lower Jurassic (Sinemurian) of La Spezia. Today, *Heteroglyphea* Colosi, 1921, is considered the junior synonym of *Pseudoglyphea* Oppel, 1861 (Glaessner, 1969). Pinna (1968, 1969), Teruzzi (1990), Garassino & Teruzzi (1990), and Garassino (1996) reported a very rich and diversified fauna of macrurans from the Lower Jurassic (Sinemurian) of Osteno (Lugano Lake, Como). Garassino & Teruzzi (2001) reported a small sample of incomplete crustaceans from the Lower Jurassic (Toarcian) of Sogno (Lecco).

In addition to these reports, Viali (1937) noted some incomplete specimens not giving their description from the Middle Jurassic (Aalenian) of Monte Peller (Trento NE Italy), and Bravi & Casertano (1999) mentioned the presence of decapod crustaceans from the Middle Jurassic (Batonian) of the Monte Fallano (Caserta, S Italy). These specimens have not been studied further.

Material

The studied specimens are usually incomplete, strongly flattened on the layer surface, and preserved in lateral, dorsal, and ventral view. Their preparation was easy owing to the soft consistency of the surrounding rock.

The studied sample (37 specimens) is housed in the Museo Civico di Storia Naturale di Milano. *Proeryon hartmanni* (v. Meyer, 1835) (21 specimens), and *Archaeopalrinurus* cfr. *A. levis* Pinna, 1974 (1 specimen) were identified. Additionally, 15 specimens were ascribed only to the superfamily Penaeoidea Rafinesque-Schmaltz, 1815, but the family, genus, and species were indeterminate because of their poor state of preservation.

The systematic palaeontology used in this paper follows the recent classification proposed by Martin & Davis (2001).

Acronym. MSNM: Museo Civico di Storia Naturale di Milano.

Systematic Palaeontology

Infraorder Palinura Latreille, 1802

Superfamily Eryonoidea De Haan, 1841

Family Coleiidae Van Straelen, 1924

Genus *Proeryon* Beurlen, 1928

Proeryon hartmanni (v. Meyer, 1835)

Figs. 4-9

Type species: *Proeryon hartmanni* (v. Meyer, 1835)

1835 - *Eryon hartmanni* v. Meyer, p. 264, Pl. 11 (Fig. 1), Pl. 12 (Fig. 2-4)

1891 - *Coleia macrophthalma* Krause; p. 177, Pl. 11 (Figs. 1-4), **nov. syn.**

1908 - *Eryon hartmanni* v. Meyer in Engel; p. 270

1911 - *Eryon richardsoni* Woodward; p. 309, Text-fig. 2, **nov. syn.**

- 1925 - *Coleia richardsoni* (Woodward) in Woods; p. 22, Pl. 6 (Fig.2)
- 1928 - *Proeryon hartmanni* (v. Meyer) in Beurlen; p. 193, Text-fig. 20, Pl. 6 (Fig. 6)
- 1928 - *Proeryon macrophthalmus* (Krause) in Beurlen; p. 194, Text-fig. 21
- 1928 - *Proeryon longiceps* Beurlen; p. 196, Text-fig. 22, nov. syn.
- 1928 - *Coleia* n. sp. in Beurlen; p. 191
- 1929 - *Proeryon hartmanni* (v. Meyer) in Glaessner; p. 339
- 1929 - *Proeryon longiceps* Beurlen in Glaessner; p. 339
- 1929 - *Proeryon macrophthalmus* (Krause) in Glaessner; p. 340
- 1944 - *Proeryon longiceps* Beurlen in Beurlen; p. 374, Pl. 34 (Fig.1)
- 1944 - *Proeryon* n. sp.? in Beurlen; p. 377, Pl. 34 (Fig.2)
- 1952 - *Proeryon banzensis* Kuhn; p. 156, Text-fig. 1, Pl. 13 (Figs.1-2), Pl. 14 (Fig.1), Pl. 15 (Fig. 1), Pl. 16 (Fig.1), nov. syn.
- 1953 - *Proeryon hartmanni* (v. Meyer) in Hauff; p. 27, Pl. 62 a
- 1969 - *Proeryon macrophthalmus* (Krause) in Glaessner; p. 470, Text-fig. 274.3
- 1980 - *Proeryon hartmanni* (v. Meyer) in Förster; p. 76
- 1980 - *Proeryon banzensis* Kuhn in Förster; p. 76
- 1986 - *Proeryon macrophthalmus* (Krause) in Mundlos; p.150, Text-fig. without number
- 1993 - *Proeryon* sp. in Schmidt-Kaler et al.; Text-fig. 47
- 1993 - *Proeryon longiceps* Beurlen in Jäger; Text-fig. 47
- 1998 - *Proeryon macrophthalmus* (Krause) in Böttcher; p. 88, Text-fig. 7.9
- 2000 - *Proeryon hartmanni* (v. Meyer) in Schweigert; Text-fig. 2
- 2001 - *Coleia* cfr. *C. banzensis* Kuhn in Garassino & Teruzzi; p. 190, Text-fig. 3
- 2001 - *Proeryon hartmanni* (v. Meyer) in Schweigert; Text-fig. 1-3
- 2001 - *Proeryon hartmanni* (v. Meyer) in Schweigert; Text-fig. 1
- 2001 - *Proeryon* sp. in Mäuser; p. 106, Text-fig. 4

Occurrence and measurements: 21 incomplete specimens fairly preserved of which six are pereiopods and isolated chelae, probably belonging to adult individuals (total length 2-3.5 cm). Seven specimens are preserved as part and counterpart.

MSNM: i26209, i26210, i26211 a-b, i26212, i26214, i26215, i26216, i26217, i26218 a-b, i26220, i26222, i26223, i26227, i26228 a-b, i26229 a-b, i26232, i26233 a-b, i26234, i26235 a-b, i26236, i26284 a-b.

The sizes of the most complete specimens are as follows:

- MSNM i26211 a-b - length of carapace: 3.4 cm
length of abdomen: 1.1 cm
- MSNM i26215 - length of carapace: 1.7 cm
length of abdomen: 1.1 cm
- MSNM i26216 - length of carapace: 1.6 cm
length of abdomen: 1.2 cm
- MSNM i26220 - wide of carapace: 1.5 cm
length of abdomen: 1 cm

The sizes of the pereiopod I are as follows:

- MSNM i26209 - length of propodus: 2.2 cm
length of dactylus: 2.4 cm
length of fixed finger: 2.3 cm
- MSNM i26222 - length of propodus: 2 cm
length of dactylus: 2.4 cm

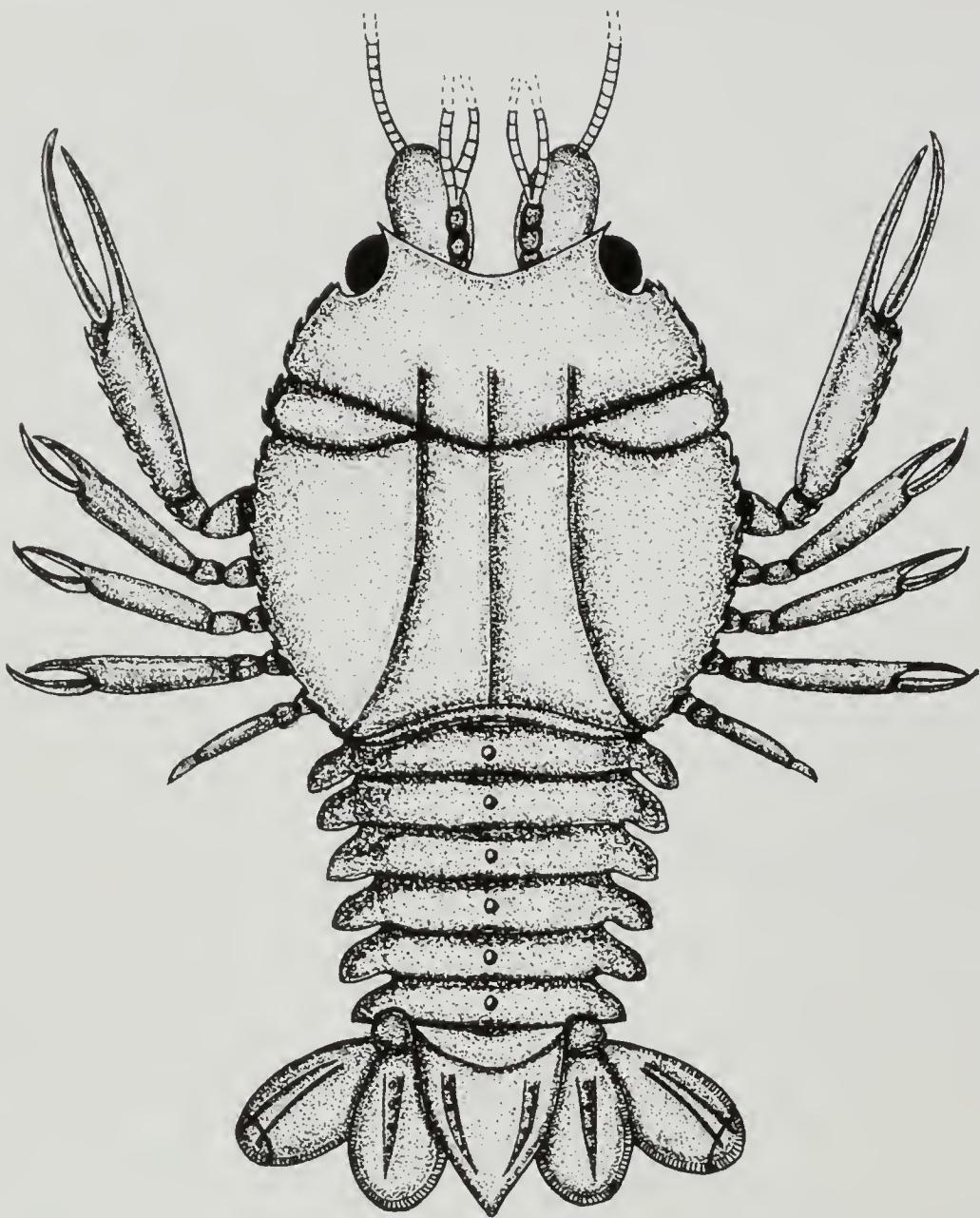


Fig. 4 - *Proeryon hartmanni* (v. Meyer, 1835), reconstruction (ricostruzione).

Discussion. Beurlen (1928) described *Proeryon* based upon some well-preserved specimens from the Toarcian of Holzmaden (Germany) and included the following species: *P. hartmanni* (v. Meyer, 1835) (= *Eryon hartmanni*), *P. macrophthalmus* (Krause, 1891) (= *Coleia macrophthalma*), *P. longiceps* Beurlen, 1928, and *P. laticaudatus* Beurlen, 1928. He pointed out that the different morphological characters of the carapace and the tail fan distinguished the above-mentioned species. Finally, Beurlen ascribed *Proeryon* to the family Eryonidae De Haan, 1841, based upon the lack of the diaeresis on the exopodite of the uropod.

Glaessner (1969) confirmed the assignment of *Proeryon* to the family Eryonidae. The discovery of new specimens in the nineties of the last century in Franconia and Swabia (Germany), ascribed to *P. hartmanni*, confirmed the pres-

ence of a diaeresis on the exopodite of the uropod (Schmidt-Kaler *et al.*, 1992). This diagnostic character, typical of the representatives of the family Coleiidae Van Straelen, 1924, justified the reassignment of *Proeryon* to this family.

Schweigert (2000), pointed out the morphological characters of *Proeryon*: oval or subrectangular carapace with V-shaped anterior margin; shallow ocular incisions; dentate and convex lateral margins wider in the posterior part; weak cervical and branchiocardiac indentations; deep and V-shaped, parallel cervical and branchiocardic grooves; pereiopods I-IV chelate with outer dactylus; somites II-VI with weak median longitudinal carina; well-developed pleura of somites II-V; subtriangular telson; and exopodite of the uropod with diaeresis.

The studied specimens are ascribed to *Proeryon* Beurlen, 1928, for the following morphological characters: oval or subrectangular carapace, V-shaped frontal margin, convex and serrate lateral margins, lateral ocular incisions, weak cervical and branchiocardiac indentations, subtriangular telson, and exopodite of the uropod with diaeresis.

Until the 1990's *Proeryon* included the following species: *P. hartmanni* (v. Meyer, 1835), *P. macrophthalmus* (Krause, 1891), *P. longiceps* Beurlen, 1928, *P. laticaudatus* Beurlen, 1928, *P. giganteus* Beurlen, 1930, *P. hanffi* Beurlen 1944, and *P. banzensis* Kuhn, 1952, from Germany, *P. moorei* (Woodward, 1866), *P. stoddarti* (Woodward, 1881), and *P. richardsoni* (Woodward, 1911) from Great Britain, and *P. viluensis* Chernyshev, 1930, from Russia.

Schweigert (2000) pointed out that *P. macrophthalmus*, *P. longiceps* and *P.*

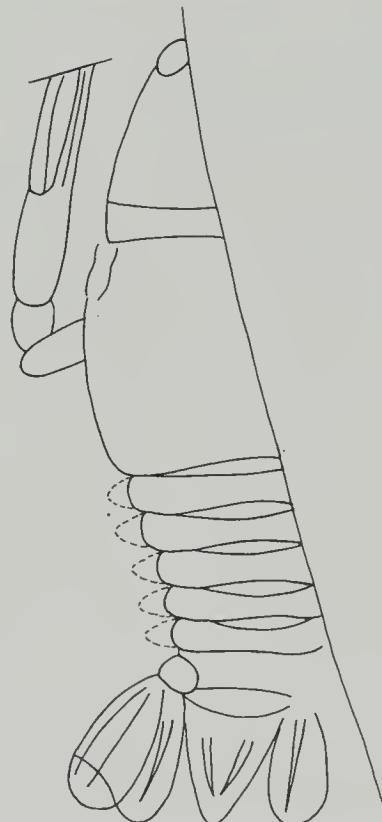


Fig. 5 - *Proeryon hartmanni* (v. Meyer, 1835), n. cat. MSNM i26211 (x 2.5).



Fig. 6 - *Proeryon hartmanni* (v. Meyer, 1835), n. cat. MSNM i26216 (x 2).

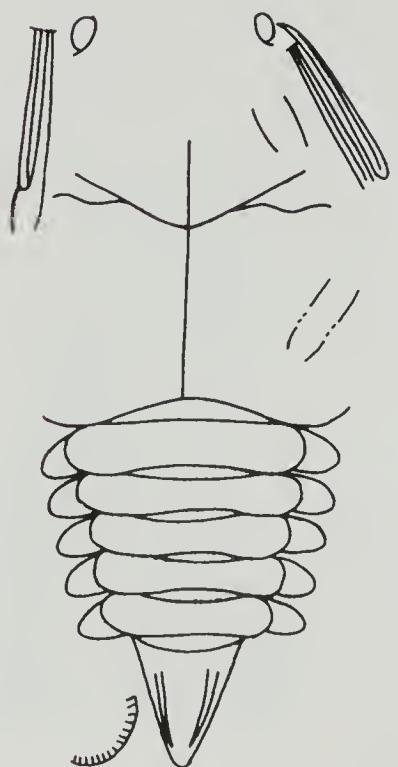


Fig. 7 - *Proeryon hartmanni* (v. Meyer, 1835), n. cat. MSNM i26234 (x 2.5).

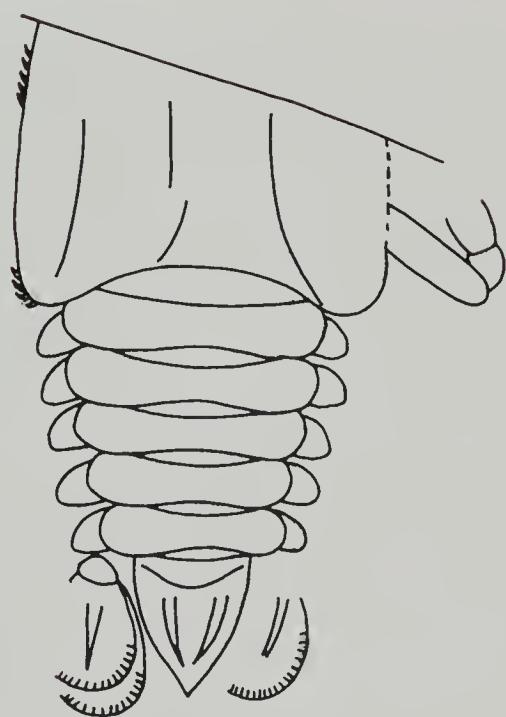


Fig. 8 - *Proeryon hartmanni* (v. Meyer, 1835), n. cat. MSNM i26235 (x 3).

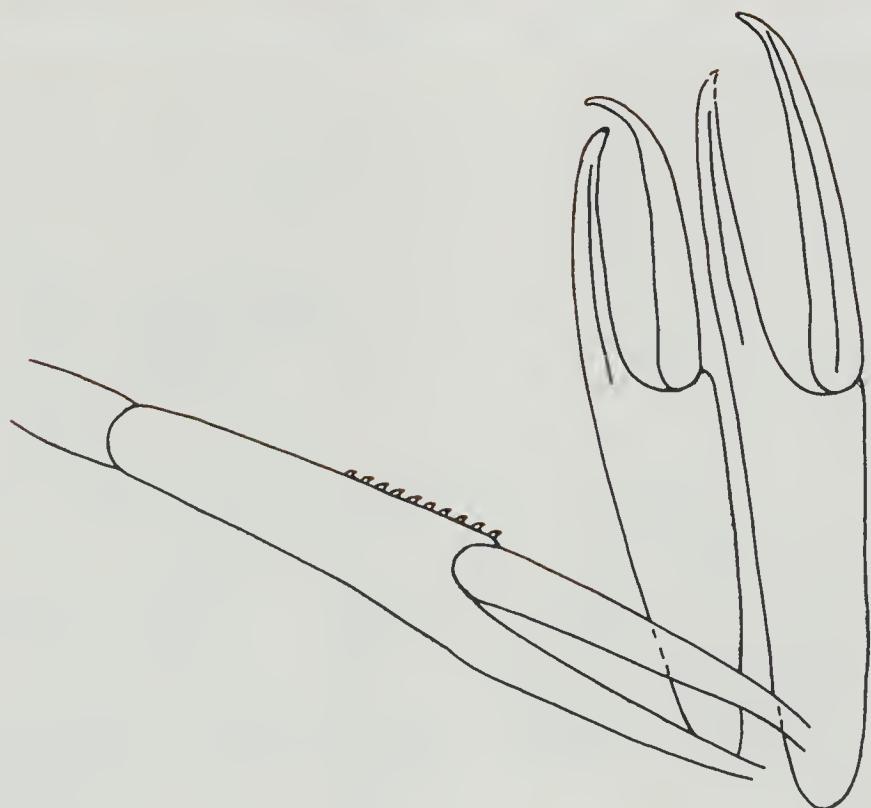


Fig. 9 - *Proeryon hartmanni* (v. Meyer, 1835), n. cat. MSNM i26228 (x 3).

banzensis are probable synonyms of *P. hartmanni*. The morphological characters observed by Beurlen and Kuhn to distinguish the above-mentioned species are probably not diagnostic. In fact, the assumed differences are mainly caused by incomplete or erroneous preparation, or by different stages of preservation. On the contrary, *P. hauffi* and *P. giganteus* differ from *P. hartmanni* by having longer and narrower carapaces. These species are probably synonyms of *P. laticaudatus*.

Finally, Schweigert (work in progress) pointed out that *Proeryon richardsoni* must be considered a synonym of *P. hartmanni*, while *P. moorei* could belong to *Coleia* Broderip, 1835, based upon the shape of carapace.

On the basis of the above-mentioned consideration, the valid species belonging to *Proeryon* are: *P. hartmanni*, *P. laticaudatus*, *P. stoddarti*, and *P. viluensis*.

We justify the ascription of the studied specimens to *P. hartmanni* for the V-shaped cervical groove and slightly sinuous branchiocardiac groove, diagnostic character of the German species.

Even though the pereiopods and isolated chelae of the studied sample are incomplete, they are larger than the small carapace specimens. Therefore, we supposed that they are probably from adult specimens of *Proeryon hartmanni*. Since the sample includes small and large-sized specimens, we conclude moreover that the studied specimens are probably ontogenetic stages of this species.

Finally, we note that the specimens of *P. hartmanni* from the Toarcian of Italy are smaller than those of German species. In fact, the adult specimens from Cesana Brianza-Suello have a total length between 8-10 cm (interpreted from the incomplete pereiopods and chelae), while the adult specimens from Germany have a total length between 15-20 cm. Since the Italian and German specimens have the same morphological characters, we suggest that this variability in the size of the body could be due by different environmental factors.

Superfamily Palinuroidea Latreille, 1802

Family Palinuridae Latreille, 1802

Genus *Archaeopalalinurus* Pinna, 1974

Archaeopalalinurus cfr. *A. levis* Pinna, 1974

Figs. 10, 11

Occurrence and measurements: one incomplete poorly preserved specimen (MSNM i26237). Length: 2.5-3 cm.

Discussion. Pinna (1974) described *Archaeopalalinurus levis* based upon some incomplete specimens from the Upper Triassic (Norian) of Cene (Val Seriana, Bergamo). Later, Pinna (1976) reported the same species from the Upper Triassic (Norian) of Prati di Rest (Valvestino, Brescia). *Archaeopalalinurus levis* Pinna, 1974, was reported also in the Norian of Ponte Giurino (Val Imagna, Bergamo) and Forni di Sopra (Val Preone, Udine) (Garassino & Teruzzi, 1993; Garassino *et al.*, 1996). Dalla Vecchia (1992) mentioned the presence of a palinurid in the Unità Fonte Santa (Upper Triassic) of Filettino (Frosinone), assigning it to *Palinurina* cfr. *P. longipes* Münster, 1839, even though the shape of the pereiopods and cephalic appendages suggests assignment to *A. levis*.

The lack of carapace and telson made the systematic placement of the studied specimen difficult. However, the shape of its uropods is comparable with the genera, *Archaeopalrinurus* Pinna, 1974, from the Upper Triassic of N Italy, and *Palinurina* Münster, 1839, from the Lower-Upper Jurassic of Great Britain and Germany.

Archaeopalrinurus and *Palinurina* are distinguished on the different ornamentation of the tail fan, the different shape, and location of the diaeresis on the exopodite of the uropod (Fig. 11). The wide and rounded uropods bearing small tubercles or spines on the dorsal surface and the exopodite with a subrounded diaeresis and posterior concavity allowed comparison of the studied specimen to *A. levis*.

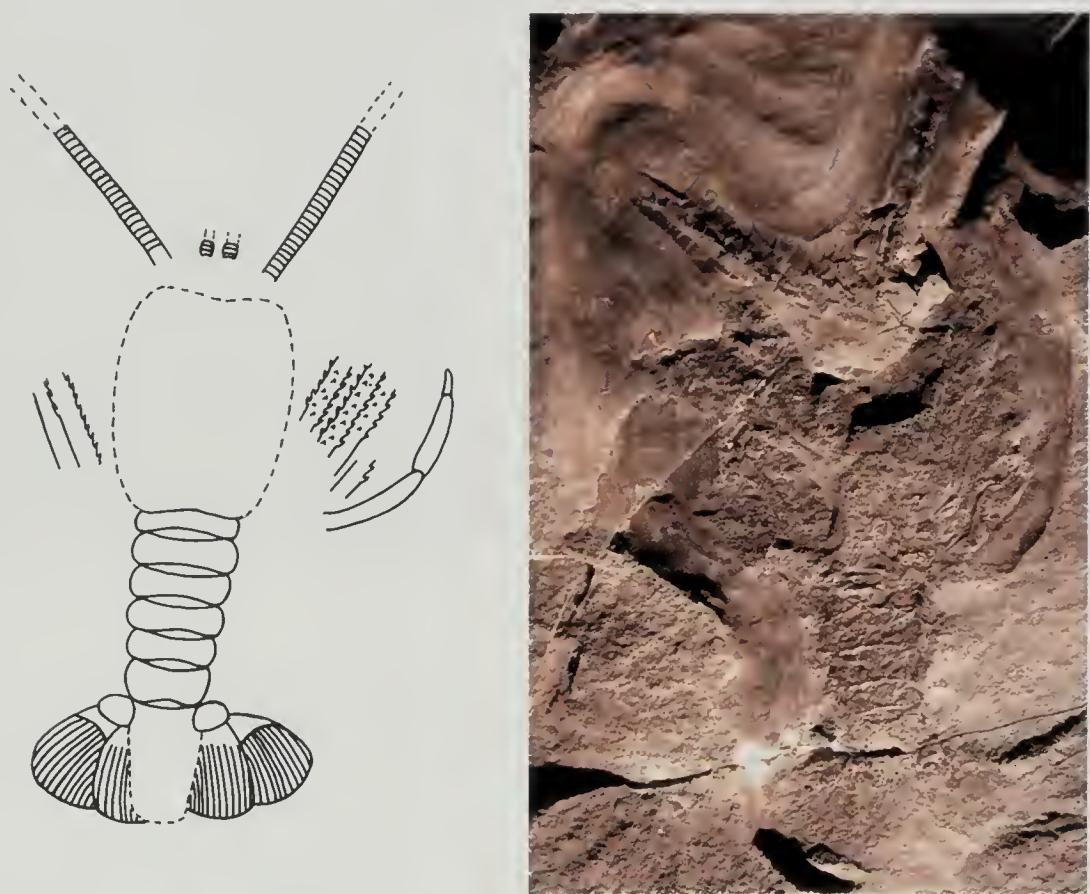


Fig. 10 - *Archaeopalrinurus* cfr. *A. levis* Pinna, 1974, n. cat. MSNM i26237 (x 2).

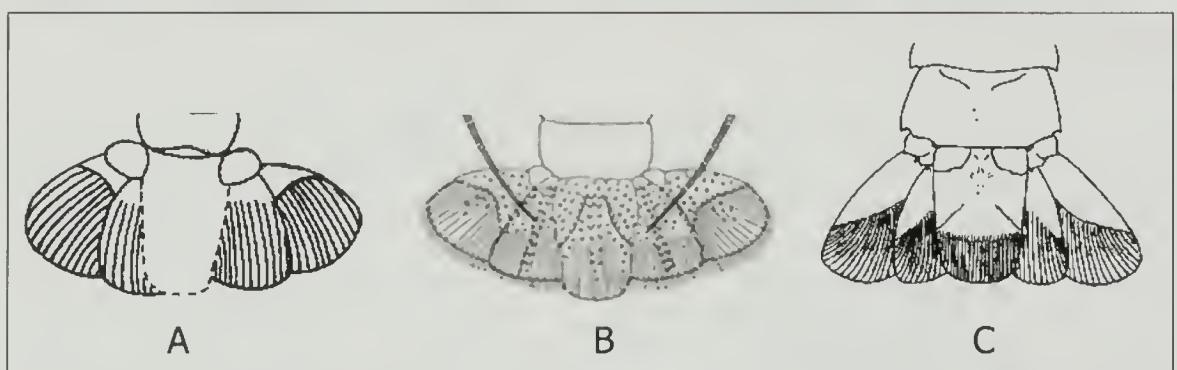


Fig. 11 - Comparison among the tail fans: studied specimen (A), *Archaeopalrinurus levis* Pinna, 1974 (B) and *Palinurina longipes* Münster, 1839 (C).

Fig. 11 - Confronto dei ventagli caudali: esemplare studiato (A), *Archaeopalrinurus levis* Pinna, 1974 (B) e *Palinurina longipes* Münster, 1839 (C).

Superfamily Penaeoidea Rafinesque-Schmaltz, 1815
Family, genus et species indeterminate
Fig. 12

Occurrence and measurements: 15 incomplete specimens, in lateral view, poorly preserved. Total length 2-5 cm. MSNM i26285 and MSNM i26299 are preserved as part and counterpart.

Discussion. The poor state of preservation of the studied specimens did not allow generic and specific assignment. However, they belong to the superfamily Penaeoidea Rafinesque-Schmaltz, 1815, because the pleura of somite II does not overlap those of somites I and III. Only the discovery of well-preserved specimens will allow in the future their morphological description, limited today to a simple report.

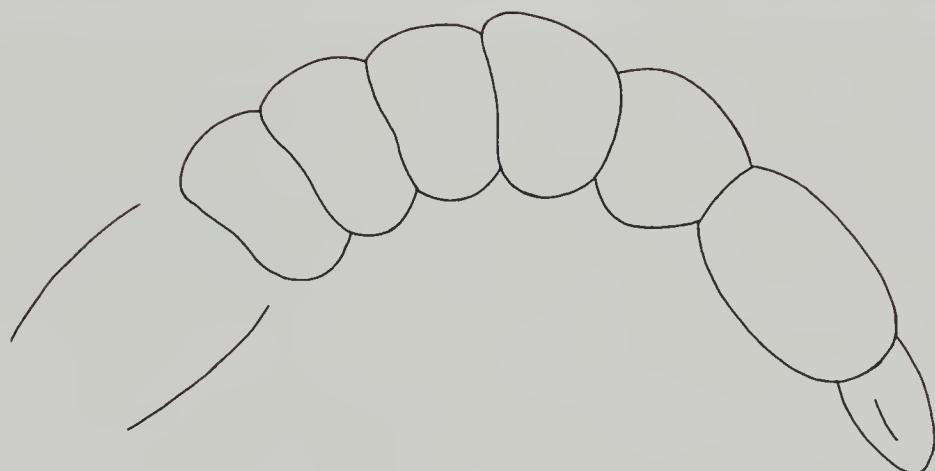


Fig. 12 - Superfamily Penaeoidea Rafinesque-Schmaltz, 1815, n. cat. MSNM i26286 (x 2).

Conclusions

Garassino & Teruzzi (2001) reported for the first time the presence of poorly preserved decapod crustaceans from the Toarcian of the Formazione di Sogno, comparing them with genera or species known in the fossil record: *Antrimpos* Münster, 1839, *Uncina* cfr. *U. posidoniae* Quenstedt, 1850, *Coleia* cfr. *C. banzensis* Kuhn, 1952, and *Etallonia* Oppel, 1861. The recent discovery of decapod crustaceans from the same Formation at the Cesana Brianza-Suello locality, the subject of the present paper, allowed recognition of *Proeryon hartmanni* (v. Meyer, 1835), already reported in Sogno locality as *Coleia* cfr. *C. banzensis* Kuhn, 1952, and the probable presence of the Triassic species *Archaeopalrinurus levis* Pinna, 1974. Finally, Schweigert *et al.* (2003) reviewed the incomplete specimens of *Uncina* Quenstedt, 1850, from Sogno, ascribing them to *Uncina alpina* Schweigert *et al.*, 2003. On the basis of these studies, the decapod fauna of the Formazione di Sogno includes the following species: *P. hartmanni*, *Archaeopalrinurus* cfr. *A. levis* and *U. alpina*. Only the specimens ascribed to *Antrimpos* and *Etallonia* remain indeterminate.

The discovery of *Proeryon* and *Uncina* in the Lower Jurassic of Lombardy is important because they provide faunal ties between the Toarcian in Italy and Germany. This analogy is also supported by the report of actinopterygians, like *Leptolepis*, and reptiles referred to *Steneosaurus* or *Metriorhynchus*.

Finally, the presence of *Archaeopalrinurus* in the Lower Jurassic of Lombardy extends the stratigraphic range of this genus, limited to date to the Upper Triassic (Norian) of Italy.

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